

NATO/PPF UNCLASSIFIED

**NORTH ATLANTIC TREATY ORGANIZATION
ORGANISATION DU TRAITE DE L'ATLANTIQUE NORD**

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16 February 2001

See CNAD AC/310 STANAG distribution

**STANAG 4170 PPS (EDITION 2) – PRINCIPLES AND METHODOLOGY FOR THE
QUALIFICATION OF EXPLOSIVE MATERIALS FOR MILITARY USE**

References:

- a. AC/310-D/137, dated 8 January 1998
- b. MAS/276-MMS/4170 dated 22 October 1985 (Edition 1)

- 1. The enclosed NATO Standardization Agreement which has been ratified by nations as reflected in page iii is promulgated herewith.
- 2. The references listed above are to be destroyed in accordance with local document destruction procedures.
- 3. AAP-4 should be amended to reflect the latest status of the STANAG.

ACTION BY NATIONAL STAFFS

- 4. National staffs are requested to examine page iii of the STANAG and, if they have not already done so, advise the Defence Support Division through their national delegation as appropriate of their intention regarding its ratification and implementation.



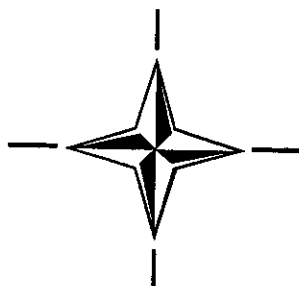
Jan H ERIKSEN
Rear Admiral, NONA
Chairman, MAS

Enclosure:
STANAG 4170 (Edition 2)

NATO/PPF UNCLASSIFIED

STANAG 4170
(Edition 2)

NORTH ATLANTIC TREATY ORGANIZATION
(NATO)



MILITARY AGENCY FOR STANDARDIZATION
(MAS)

STANDARDIZATION AGREEMENT

(STANAG)

SUBJECT: PRINCIPLES AND METHODOLOGY FOR THE QUALIFICATION OF
EXPLOSIVE MATERIALS FOR MILITARY USE

Promulgated on 16 February 2001

A handwritten signature in black ink, appearing to read 'Jan H. Eriksen'. The signature is fluid and cursive, with a prominent initial 'J'.

Jan H ERIKSEN
Rear Admiral, NONA
Chairman, MAS

RECORD OF AMENDMENTS

No.	Reference/date of amendment	Date entered	Signature

EXPLANATORY NOTESAGREEMENT

1. This NATO Standardization Agreement (STANAG) is promulgated by the Chairman MAS under the authority vested in him by the NATO Military Committee.
2. No departure may be made from the agreement without consultation with the tasking authority. Nations may propose changes at any time to the tasking authority where they will be processed in the same manner as the original agreement.
3. Ratifying nations have agreed that national orders, manuals and instructions implementing this STANAG will include a reference to the STANAG number for purposes of identification.

DEFINITIONS

4. Ratification is "In NATO Standardization, the fulfilment by which a member nation formally accepts, with or without reservation, the content of a Standardization Agreement" (AAP-6).
5. Implementation is "In NATO Standardization, the fulfilment by a member nation of its obligations as specified in a Standardization Agreement" (AAP-6).
6. Reservation is "In NATO Standardization, the stated qualification by a member nation that describes the part of a Standardization Agreement that it will not implement or will implement only with limitations" (AAP-6).

RATIFICATION, IMPLEMENTATION AND RESERVATIONS

7. Page (iii) gives the details of ratification and implementation of this agreement. If no details are shown it signifies that the nation has not yet notified the tasking authority of its intentions. Page (iv) (and subsequent) gives details of reservations and proprietary rights that have been stated.

FEEDBACK

8. Any comments concerning this publication should be directed to NATO/MAS - Bvd Leopold III - 1110 Brussels - BE

NAVY/ARMY/AIR

NATO STANDARDIZATION AGREEMENT
(STANAG)

"PRINCIPLES AND METHODOLOGY FOR THE QUALIFICATION OF
EXPLOSIVE MATERIALS FOR MILITARY USE"

Annexes:

- A. Identification of National Authorities.
- B. Explosive Qualification Certificate.

Related documents:

- | | |
|-------------|--|
| AOP-7 | Manual of Data Requirements and Tests for the Qualification of Explosive Materials for Military Use. |
| AOP-15 | Guidance on the Assessment of the Safety and Suitability for Service of Munitions for NATO Armed Forces. |
| STANAG 4117 | Explosives, Stability Test Procedures and Requirements for Propellants Stabilised with Diphenylamine, Ethyl Centralite or Mixtures of both. |
| STANAG 4147 | Chemical Compatibility of Ammunition Components with Explosives (Non Nuclear Applications). |
| STANAG 4297 | Guidance on the Assessment of the Safety and Suitability for Service of Munitions for NATO Armed Forces - Implements AOP-15. |
| STANAG 4443 | Explosives, Uniaxial Compressive Test. |
| STANAG 4487 | Explosives, Friction Sensitivity Tests. |
| STANAG 4488 | Explosives, Shock Sensitivity Test(s). |
| STANAG 4489 | Explosives, Impact Sensitivity Tests. |
| STANAG 4490 | Explosives, Electrostatic Discharge Sensitivity Tests. |
| STANAG 4491 | Explosives, Thermal Sensitiveness and Explosiveness Tests. |
| STANAG 4506 | Explosive Materials, Physical/Mechanical Properties Uniaxial Tensile Test. |
| STANAG 4507 | Explosives Materials, Physical/Mechanical Properties, Stress Relaxation Test in Tension. |
| STANAG 4515 | Explosives, Thermal Characterisation, by Differential Scanning Calorimetry, Differential Thermal Analysis and Thermo-Gravimetric Analysis. |
| STANAG 4518 | Disposal and Demilitarization. |
| STANAG 4525 | Explosives, Physical/Mechanical Properties, Thermo-Mechanical Analysis for Determining Coefficient of Linear Thermal Expansion (TMA). |
| STANAG 4527 | Explosives, Chemical Stability, Nitro-cellulose Based Propellants, Procedure for Assessment of Chemical Life and Temperature Dependence of Stabiliser Consumption Rates. |
| STANAG 4540 | Explosives, Procedures for Dynamic Mechanical Analysis (DMA) and Determination of Glass Transition Temperature. |

- STANAG 4541 Explosives, Stability Test Procedure and Requirements for Nitro-cellulose Based Propellants containing Nitroglycerine and Stabilised with Diphenylamine.
- STANAG 4542 Explosives, Stability Test Procedure and Requirements for Nitro-cellulose Based Propellants containing Nitroglycerine and Stabilised with 2 Nitro-Diphenylamine.
- STANAG 4556 Explosives, Vacuum Stability Test.

AIM

1. The aims of this agreement are:
 - (a) to establish the concept and requirement for Qualification of explosive materials by a National Authority for military use by NATO nations;
 - (b) to ensure that only explosive materials sufficiently characterised and assessed as possessing properties making them safe and suitable for consideration for military use are Qualified for an intended role. A change of role (e.g. the use of a Qualified booster as a main charge explosive) will require a separate assessment on a case-by-case basis, to determine whether that explosive can be used in a new particular application not covered under the intended (original) role;
 - (c) to provide for NATO nations an acceptable and uniform basis to achieve Qualification status of explosive materials by the adoption of the principles and methodology described in this STANAG and related document AOP-7.

DEFINITIONS

2. The following terms and definitions are used for the purpose of this agreement:
 - (a) Assessment. The evaluation of the properties of an explosive material, including the results of appropriate tests, to determine its relationship, with particular regard to safety, to other known explosive materials already in service use.
 - (b) Explosive Material. An explosive material is a substance (or mixture of substances) which is capable by chemical reaction of producing gas at such a temperature and pressure as to cause damage to the surroundings. Included are pyrotechnic substances even when they do not evolve gases. This document will refer only to those explosive materials whose application requires that they shall react reliably on demand. The term "explosive" thus includes all solid and liquid materials variously known as high explosives and propellants, together with igniter, primer, initiatory and pyrotechnic (e.g. illuminant, smoke, delay, decoy, flare and incendiary) compositions.
 - (c) Qualification. This is the assessment of the explosive material by the National Authority according to this STANAG and AOP-7 to determine whether it possesses properties which make it safe and suitable for consideration for use in its intended role.
 - (d) Qualified Explosive Material. An explosive material which has successfully completed the Qualification process of a National Authority. This is an intermediate risk reduction stage prior to Final (or Type) Qualification.
 - (e) Final (or Type) Qualification. Final (or Type) Qualification relates to the use of the explosive material in a specific application or munition. Final Qualification is given when the explosive has been assessed as part of the design of the specific munition, and predicted to be safe and suitable for military operational or training use in that role. The database of results is a means of undertaking "Risk Assessment".

- (f) New Explosive Material. The term "New Explosive Material" encompasses:
- (1) an explosive material not previously Qualified;
 - (2) an explosive material for which the existing specification defining its composition, its material constituents or the process by which the composition is prepared has been modified;
 - (3) an explosive material resulting from a change in manufacturer or manufacturing location;
 - (4) an explosive material used in a role (See paragraph 2.h) for which it has not already been Qualified.
- (g) Comparison Explosive. An in-service explosive with proven safety characteristics whose properties are used to assess the relative safety and suitability of a new explosive intended for use in a similar role.
- (h) Intended Role. The main roles are listed as follows. Nations may define other roles or add to specific information for the intended application of a particular explosive material.
- (1) Primary Explosive. Substance, or mixture of substances, used to initiate a detonation or a burning reaction. In their intended role these materials are sensitive to a range of thermal, mechanical and electrical stimuli.
 - (2) Booster Explosive. Explosive material used to augment and transmit the reaction (initiated by the primary explosive) with sufficient energy to initiate a detonation reaction in the main charge.
 - (3) High Explosive. Material which is used as a detonating final charge.
 - (4) Solid Gun Propellant. Substance or mixture of substances which is required to burn in a controlled manner within a gun combustion chamber producing hot gases capable of propelling a projectile at high velocity. Combustible cases may also be included as they contribute to the overall energy of the propellant.
 - (5) Solid Rocket Propellant. Substance, or mixture of substances, which is required to burn in a controlled manner within a rocket motor producing hot gases which are vented through a nozzle to propel the munition.
 - (6) Liquid Propellant. Substance, or mixture of substances, which is required to react in a combustion chamber in a controllable manner in order to generate propulsive force. These may be mono-propellants, bi-propellants or hybrids comprised of liquids and solids.
 - (7) Pyrotechnic Compositions. Substances, or mixtures of substances, which when ignited undergo an energetic chemical reaction at a controlled rate intended to produce on demand and in various combinations, specific time delays or quantities of heat, noise, smoke, light or infrared radiation. Pyrotechnic compositions may be used to initiate burning reactions such as in igniters.

Note: Pyrotechnic compositions may be Qualified for specific role(s) such as time delay, illuminating flare etc. The Qualification status is not valid for other pyrotechnic roles for which the composition has not been assessed.

AGREEMENT

3. Participating nations agree that new explosive materials proposed for military use shall be assessed in accordance with the principles and methodology described in this STANAG and related document AOP-7. The degree of testing to achieve Qualification status may vary between the nations but it is agreed that the mandatory data requirements and assessment principles listed in this STANAG shall be the minimum requirement, supported by additional requirements described in AOP-7. Explosives already in service for which there is a well established history of safe and satisfactory use, providing the original material specifications remain the same, may be considered Qualified for use in the same role without further testing. National Authorities will assess whether changes to a specification, constituent or manufacturing process of an already Qualified explosive will necessitate further testing and assessment. The data used by the National Authority to Qualify an explosive material for military use in accordance with this STANAG shall be made available to the National Authority of nations participating in a collaborative weapon development or procurement programme upon a valid request. Each nation reserves the right to request additional data, explanation or clarification or to perform its own additional testing before nationally Qualifying the explosive material for its own military use. The use of Intellectual Property Right (IPR) data shall be respected at all times. In principle Qualification is granted by a National Authority, normally in the nation of origin of the explosive, otherwise in the nation developing the munition or munition component.

DETAILS OF AGREEMENT

4. (a) Each participating nation will identify its appropriate National Authority(ies) for the Qualification of explosive materials. The National Authority will maintain records and test data relating to each Qualification and the information used to grant, deny or restrict Qualification. The National Authorities responsible for performing the assessment and Qualification functions identified in this STANAG are listed at Annex A. This Annex will be reviewed as necessary, and updated, by AC/310, Sub-Group 1 (Explosives), of the NATO Conference of National Armament Directors.
- (b) The assessment for Qualification should be completed before the decision is made to use the material in a munition. However, it is emphasised that the Qualification of a new explosive material on the basis of the provisions of this STANAG does not imply Final (or Type) Qualification for a specific munition. Final (or Type) Qualification has to be considered as a part of the assessment of Safety and Suitability for Service of this munition, according to STANAG 4297 and AOP-15. Final (or Type) Qualification is not subject to this agreement, but additional information on this topic is supplied in AOP-7.
- (c) The Qualification of an explosive material relates to a defined specification from a particular manufacturer and manufacturing location and using a particular manufacturing process. Where there is a change to:
- (1) the specifications;
 - (2) the source of raw materials;
 - (3) the manufacturing process;
 - (4) the manufacturer or manufacturing location;
- or there has been a loss of manufacturing know-how, it should not be assumed that the original judgement remains valid; requalification or partial requalification may be required.

- (d) Pass/fail criteria will not be applied to test results, except where noted in relevant test STANAGs and AOP-7. Judgement on overall safety and suitability for service will be made by comparison with the test results of explosive materials which have been used satisfactorily in the same role, together with relevant background information.
- (e) An explosive material may be Qualified in its own right without any immediate application being envisaged. It would then be available to weapon designers for use in a future munition in the role for which it was Qualified.
- (f) Any modification to an existing specification defining the composition of the explosive material, its material constituents, or the process for the preparation of a composition which has been Qualified, shall be notified to all National Authorities previously supplied with the original information by the originating National Authority.

METHODOLOGY FOR QUALIFICATION OF NEW EXPLOSIVE MATERIALS

5. For assessment of new explosive material leading to its Qualification, the following shall be identified:

- (a) the explosive composition and its intended role;
- (b) the characteristics of the explosive material which are relevant to its intended role and any specific application that is envisaged;
- (c) the characteristics of the explosive material in its powdered state, as-used condition and after possible degradation due to ageing and the service environment;
- (d) the effect of temperature, particularly on the safety and performance characteristics of explosive materials. Characteristics of particular interest include thermal, mechanical, and electrostatic discharge sensitiveness, rheological and physical properties (for example, for thermal sensitiveness the ignition temperature and effects of confinement, charge size and heating rate should be known. In the case of mechanical sensitiveness, the sensitiveness to shock, friction, impact, or to a non-penetrating object, such as a crush or drop, or the effect of confinement and charge size on explosiveness should be known. For electrostatic discharge, the materials sensitiveness to static electricity should be assessed);
- (e) knowledge of the variation of rheological and physical properties with temperature and age of the material;
- (f) the toxicity and disposal data on the explosive material, its components, and its reaction products, in-so-far-as possible;
- (g) the appropriate National Authority shall identify the minimum data requirements which are needed to fulfil the conditions of 4(b) and the test programme necessary. This shall include, but not be limited to, the mandatory tests (for the intended role) given in this STANAG;
- (h) tables 1 and 2 provide explosive material characteristics which need to be determined. Additional tests may also be further referenced in AOP-7. Procedures and equipment detailed in appropriate STANAGs shall be used to conduct the test methods. Table 3 provides guidance on the use of these test STANAGs for a range of applications. AOP-7 contains additional guidance on procedures where STANAGs for explosive material properties are not available;

- (i) after completion of the test programme the Qualification report shall be produced by the National Authority, or an organisation approved by a National Authority, identifying the explosive composition, developer/manufacturer, the organisation that conducted the tests, test results, intended role and Qualifying National Authority. The report shall include comparison of the test data with that of explosive material of known and proven satisfactory use in the same role;
- (j) if the composition characteristics are considered acceptable, the National Authority shall pronounce Qualification of the explosive material as safe and suitable for military use in a given role. Information collected in support of advice for safety and suitability for service should be recorded by the National Authority. In-service problems experienced by explosive materials should be analysed and, where appropriate, Qualification of the material should be reconsidered. A formal Qualification certificate (for example as shown at Annex B) shall be issued.

QUALIFICATION OF IN-SERVICE EXPLOSIVE MATERIAL

6. Providing there has been no change to the specification, explosive material already in service for which there is a history of satisfactory application may be considered Qualified by the National Authority for use in the same role (e.g. main charge filling, booster, primary, rocket motor propellant, gun propellant, pyrotechnic, etc.), without further testing. The National Authority will define the need for any restrictions of the role and for any further testing in specific cases.

IMPLEMENTATION OF THE AGREEMENT

7. This STANAG is implemented when a nation has issued the necessary national instructions/orders that new, modified, and in-service explosive materials shall be assessed in accordance with the principles and methodology contained herein.

TABLE 1 - COMPOSITION DETAILS, USE AND SAFETY - MANDATORY REQUIREMENTS

Composition and Safety - Mandatory Requirements	Type of Information
Details of the composition and its ingredients shall be given.	Composition and specification. Method of manufacture. Source of ingredients.
Details of its intended role and explosive type shall be specified.	Main warhead filling, booster charge, primary explosive, pyrotechnic, propellant etc.
Details of its form as used in service shall be given.	Pressed, cast, extruded, machinability etc.
Chemical and physical properties. shall be given.	Acidity, alkalinity, density (also as percentage of theoretical maximum density), melting/softening point, etc.
Comparisons to other similar compositions (if any) already in service shall be specified.	Service applications of closely related compositions and their status in regard to Qualification.
Information pertinent to material toxicity and disposal shall be specified.	Inherent toxicity data and information on the ability to be reused, recycled or destroyed with minimum effect on health and environment.
Compliance with National Health and Safety requirements shall be given.	Material Hazard Data Sheet, etc.

TABLE 2 - MANDATORY QUALIFICATION DATA AND ASSOCIATED STANAGs

MANDATORY DATA	PRIMARY EXPLOSIVE	BOOSTER EXPLOSIVE	HIGH EXPLOSIVE	SOLID GUN PROPELLANT	SOLID ROCKET PROPELLANT	LIQUID PROPELLANT	PYROTECHNIC COMPOSITION
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
Stability & Thermal characterisation ⁽¹⁾	4515	4515 & 4556	4515 & 4556	4515, 4556, 4117, 4527, 4541 & 4542	4515, 4556, 4117, 4527 & 4542	4515	4515
Compatibility ⁽²⁾	4147	4147	4147	4147	4147	4147	4147
Ignition Temperature	4515	4515, 4491	4515, 4491	4491	4491	4491	4515, 4491
Explosive response when ignited (confined and unconfined)	Not Applicable	4491	4491	4491	4491	4491	4491
Electrostatic Discharge	4490	4490	4490	4490	4490	Not Applicable	4490
Impact	AOP-7	4489	4489	4489 ⁽⁴⁾	4489	AOP-7	4489
Friction	AOP-7	4487	4487	4487 ⁽⁴⁾	4487	AOP-7	4487
Shock	Not Applicable	4488	4488	4488 ⁽⁶⁾	4488	4488	4488 ⁽⁵⁾
Critical Diameter ⁽³⁾	Not Applicable	AOP-7	AOP-7	AOP-7	AOP-7	AOP-7	AOP-7 ⁽⁵⁾
Detonation Velocity ⁽⁷⁾	Not Applicable	AOP-7	AOP-7	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Mechanical/ Rheological Properties ⁽⁶⁾	Not Applicable	4506, 4507, 4525, 4540, 4443 & AOP-7	4506, 4507, 4525, 4540, 4443 & AOP-7	4507, 4525, 4540, 4443 & AOP-7	4506, 4507, 4525, 4540, 4443 & AOP-7	Not Applicable	AOP-7
Variation of properties with age	AOP-7	AOP-7	AOP-7	AOP-7	AOP-7	AOP-7	AOP-7

Table 2 Guidance Notes:

- (1) Stability & thermal characterisation, solid gun and rocket propellants, STANAGs 4515, 4556, 4117, 4527, 4541 & 4542: Table 3 provides further guidance on which STANAG applies. STANAGs for the measurement of specific stabiliser(s) are mandatory for relevant propellants. STANAG 4527 is not mandatory. Where no STANAG exists for the measurement of a particular stabiliser, National Assessment applies. Mandatory STANAGs for composite propellants are STANAG 4515 and STANAG 4556.
- (2) Compatibility should be investigated on a case-by-case basis and that it should be addressed for combinations of the explosive and materials expected to come into contact with the material during processing, storage, or service use.
- (3) In the case of liquid propellants this would equate to the critical film thickness.
- (4) These STANAGs may not be appropriate for all solid gun propellants, advice from the National Authority shall be sought.
- (5) This STANAG and AOP may not be appropriate for all pyrotechnic compositions, advice from the National Authority must be sought.
- (6) Not necessarily mandatory, national requirements only.
- (7) Detonation velocity, is required to be representative of the composition density whilst in service use.

Comments:

1. Additional tests may also be further referenced in AOP-7.
2. Table 3 provides guidance on the use of test STANAGs and methods.

TABLE 3 - GUIDANCE ON THE USE OF TEST STANAGs AND ASSOCIATED METHODS.

STANAG/ SUBJECT	TEST PROCEDURE	PRIMARY EXPLOSIVE	BOOSTER EXPLOSIVE	HIGH EXPLOSIVE	SOLID GUN PROPELLANT	SOLID ROCKET PROPELLANT	LIQUID PROPELLANT	PYROTECHNIC COMPOSITION
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
17 propellant stability	Chemical analysis or HPLC	no	no	no	yes, only SB + DPA DB + EC	yes, only DB + EC	no	no
17 compatibility	Vacuum Stability	no	yes	yes	yes	yes	no	no
	HFC	no	no	no	yes	yes	no	no
	TGA	yes	yes	yes	yes	yes	yes	yes
	DSC	yes	yes	yes	yes	yes	yes	yes
	Chemical Analysis	yes	no	no	yes	yes	no	yes
13 axial compressive strength	Rheological Properties	no	yes (PBX)	yes (PBX)	yes	yes	no	no
37 friction	Friction	no	yes	yes	yes	yes	no	yes
18 (1) rock sensitivity	Small Scale	no	yes	yes	no	no	no	no
	Intermediate Scale	no	yes	yes	yes	yes	yes	no
	Expanded Large Scale	no	yes	yes	yes	yes	yes	no
	Super large scale	no	no	yes	yes	yes	yes	no
19 (2) react		no	yes	yes	yes	yes	no	yes

TABLE 3 (continued) - GUIDANCE ON THE USE OF TEST STANAGs AND ASSOCIATED METHODS.

STANAG/ SUBJECT	TEST PROCEDURE	PRIMARY EXPLOSIVE	BOOSTER EXPLOSIVE	HIGH EXPLOSIVE	SOLID GUN PROPELLANT	SOLID ROCKET PROPELLANT	LIQUID PROPELLANT	PYROTECHNIC COMPOSITION
000 Custodial charge	Small Scale	yes	yes	yes	yes	yes	no	yes
	Large Scale	no	yes	yes	yes	yes	no	no
	DTA	yes	yes	yes	yes	yes	yes	yes
	DSC	yes	yes	yes	yes	yes	yes	yes
	Temperature of Ignition	yes	yes	yes	yes	yes	yes	yes
	Woods Metal Bath	no	yes	yes	yes	yes	yes	yes
	Koenen Tube	no	yes	yes	yes	yes	yes	yes
	Variable confinement tube (FCO & SCO)	no	yes	yes	yes	yes	no	yes
	Tube test (FCO & SCO)	no	yes	yes	yes	yes	no	yes(if with binder)
	Rheological Properties	no	yes (PBX)	yes (PBX)	no	yes	no	yes
6 axial ile test		no	yes	yes	yes	yes	no	no
7 ss axation		no	yes	yes	yes	yes	no	no

TABLE 3 (continued) - GUIDANCE ON THE USE OF TEST STANAGs AND ASSOCIATED METHODS.

STANAG/ SUBJECT	TEST PROCEDURE	PRIMARY EXPLOSIVE	BOOSTER EXPLOSIVE	HIGH EXPLOSIVE	SOLID GUN PROPELLANT	SOLID ROCKET PROPELLANT	LIQUID PROPELLANT	PYROTECHNIC COMPOSITION
415 [4]	DTA	yes	yes	yes	yes	yes	yes	yes
416 Thermal characterisation	DSC	yes	yes	yes	yes	yes	yes	yes
417 TGA	TGA	yes	yes	yes	yes	yes	yes	yes
418 TMA		no	yes	yes	yes	yes	no	no
419 Ageing Multi- pellant stability	Ageing Multi- temperature	no	no	no	yes	yes	no	no
420 DMA		no	yes	yes	yes	yes	no	no
421 Propellant stability DB + DPA	Propellant stability DB + DPA	no	no	no	yes DB + DPA	no	no	no
422 Propellant stability DB + 2-NDPA	Propellant stability DB + 2-NDPA	no	no	no	yes, 2-NDPA based	yes	no	no
426 [5] Stability	(either method acceptable)	no	yes	yes	yes	yes	no	yes, if with binder

Table 3 Guidance notes:

1. STANAG 4488, Explosives; Shock Sensitivity Test(s), use appropriate scaled test, not all tests are required.
2. STANAG 4489, Explosives; Impact Sensitivity Tests, tests include ERL/Bruceton Machine with Type 12 tools, Rotter Impact Machine, BAM Impact Machine, appropriate test method chosen to comply with National Authority requirements.
3. STANAG 4491, Explosives. Thermal Sensitiveness and Explosiveness Tests; not all tests are required, refer to STANAG.
4. STANAG 4515, Explosives; Thermal Characterisation, only one test should be sufficient to comply with the Qualification requirements.
5. STANAG 4556, Explosives; Vacuum Stability Test, consists of two equivalent methods, one uses a manometer and the other a transducer, there is no preference for either test method.

IDENTIFICATION OF NATIONAL AUTHORITIES

1. Each participating nation will identify its appropriate national authority(ies) for the Qualification of explosive materials for military use. The authority will maintain a code to identify the Qualified explosive materials and will maintain records and test data relating to each Qualification or to the information used to grant, deny or restrict Qualification.

2. The authorities nominated by the nations are listed below. This list will be reviewed as necessary and updated, by AC/310 Sub Group I (Explosives) of the NATO Conference of National Armament Directors (CNAD) organisation.

3. **LIST OF NATIONAL AUTHORITIES**

- (a) Canada: Directorate of Ammunition Program Management
National Defence Headquarters,
Louis St-Laurent Building,,
555 Boul. Du Casino,
Hull, Qc, Canada
J8Y 6R5
- (b) Czech Republic Military Institute for Weapon and Ammunition Technology
Dlouhá 300
763 21 Slavičín
Czech Republic
- (c) Denmark: Explosives Safety Commission,
Danneskiold-Samsøes Alle 1,
Holmen, DK 1434
Copenhagen,
Denmark
- (d) France: DGA IPE/SM
00303 Paris Armées,
France
- (e) Germany Defence Institute For Materials, Explosives, Fuels and Lubricants
(WIWEB),
53913 Swisttal-Heimerzheim,
Germany
- (f) Italy: Ministero della Difesa,
Direzione Generale,
Degli Armamenti Terrestri,
Via Marsala 104,
00100 Roma, Italia

- (g) The Netherlands
 - NATCO/LBBKL/Munitiebedrijf
 - C-Munitiebedrijf
 - P.O.Box 3003
 - 3800 DA Amersfoort
 - The Netherlands
- (h) Norway:
 - Navy Material Command
 - Navmat Comnov
 - Technical Department,
 - Weapons Division,
 - PO Box Haakonsværn,
 - 5886 Bergen
 -
 - Army Material Command
 - To be advised
 -
 - Air Force Material Command
 - To be advised
- (i) UK:
 - Defence Procurement Agency
 - Ordnance Safety Group,
 - Walnut 2c, # 67,
 - MOD Abbey Wood,
 - Bristol. BS34 8JH
 - UK.
- (j) US:
 - Office of the Under Secretary of Defense,
 - OUSD (A&T)/S&TS,M (Room 3B1060),
 - 3090 Defense - Pentagon,
 - Washington, DC 20301-3090,
 - USA
- (k) Other Countries: To be advised

EXAMPLE: SUGGESTED FORMAT FOR AN EXPLOSIVE QUALIFICATION CERTIFICATE.

EXPLOSIVE QUALIFICATION CERTIFICATE	
Explosive Name:	Country of Origin:
Specification Number:	Manufacturer:
Composition Details: (With percentages)	Qualified Role:
Is it one of the following: ?	
a) Completely New Composition (yes or no)	Restrictions on use:
b) Modified Composition: (yes or no) (Name of reference composition)	Test Results/Assessment Ref:
or	
c) In Service Composition: (yes or no)	National Authority:

RATIFICATION AND IMPLEMENTATION DETAILS
STADE DE RATIFICATION ET DE MISE EN APPLICATION

N A T I O N S	NATIONAL RATIFICATION REFERENCE	NATIONAL IMPLEMENTING DOCUMENT	IMPLEMENTATION/MISE EN APPLICATION					
	REFERENCE DE LA RATIFICATION NATIONALE	DOCUMENT NATIONAL DE MISE EN APPLICATION	INTENDED DATE OF IMPLEMENTATION			DATE IMPLEMENTATION WAS ACHIEVED		
			DATE ENVISAGEE DE MISE EN APPLICATION			DATE EFFECTIVE DE MISE EN APPLICATION		
			NAVY MER	ARMY TERRE	AIR	NAVY MER	ARMY TERRE	AIR
BE								
CA	2441-4170 (DA PM4-4) of/du 18.10.00	STANAG	12.00	12.00	12.00			
CZ	6/2-18/2000-1419 of/du 26.07.00	STANAG		12.03	12.03			
DA+	FKO MAM3 204.69-S4170 0004926-003 of/du 05.07.00	STANAG	04.00	04.00	04.00			
FR	Décision N°1071 DGA/DSA du/of 27.07.00	DGA n° 11500	09.00	09.00	09.00			
GE	BMVg-Fü SIV 1 Az 03-51-60 of/du 14.09.00	STANAG				09.00	09.00	09.00
GR	Ø 049.8a/410434/Σ391 of/du 17.04.00	STANAG	06.00	06.00	06.00			
HU								
IT								
LU								
NL*	M2000004891 of/du 05.10.00	STANAG				02.01	02.01	02.01
NO								
PL								
PO								
SP								
TU								
UK	D/Dstan/12/15/4170 of/du 09.06.00	STANAG	01.00	01.00	01.00			
US	OUSDA(A&T) of/du 15.11.00	MIL-STD-1751						

* See overleaf reservations/Voir réserves au verso

+ See comments overleaf/Voir commentaires au verso

RESERVES/RESERVATIONS

NETHERLANDS

1. The application of STANAGs referred to as being mandatory may be limited to STANAGs ratified by the Netherlands.
2. STANAG 4170 (Ed.2) will only be implemented with respect to new explosive materials and modified explosive materials.

PAYS-BAS

1. La mise en application des STANAG mentionnés comme obligatoires peut se limiter aux STANAG ratifiés par les Pays-Bas.
2. Le STANAG 4170 (édition 2) ne sera mis en application qu'en ce qui concerne les nouvelles substances explosives et les substances explosives modifiées.

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COMMENTS/COMMENTAIRES

DENMARK

STANAG will be used as the implementing document.

DANEMARK

Ce STANAG sera utilisé comme document de mise en application.